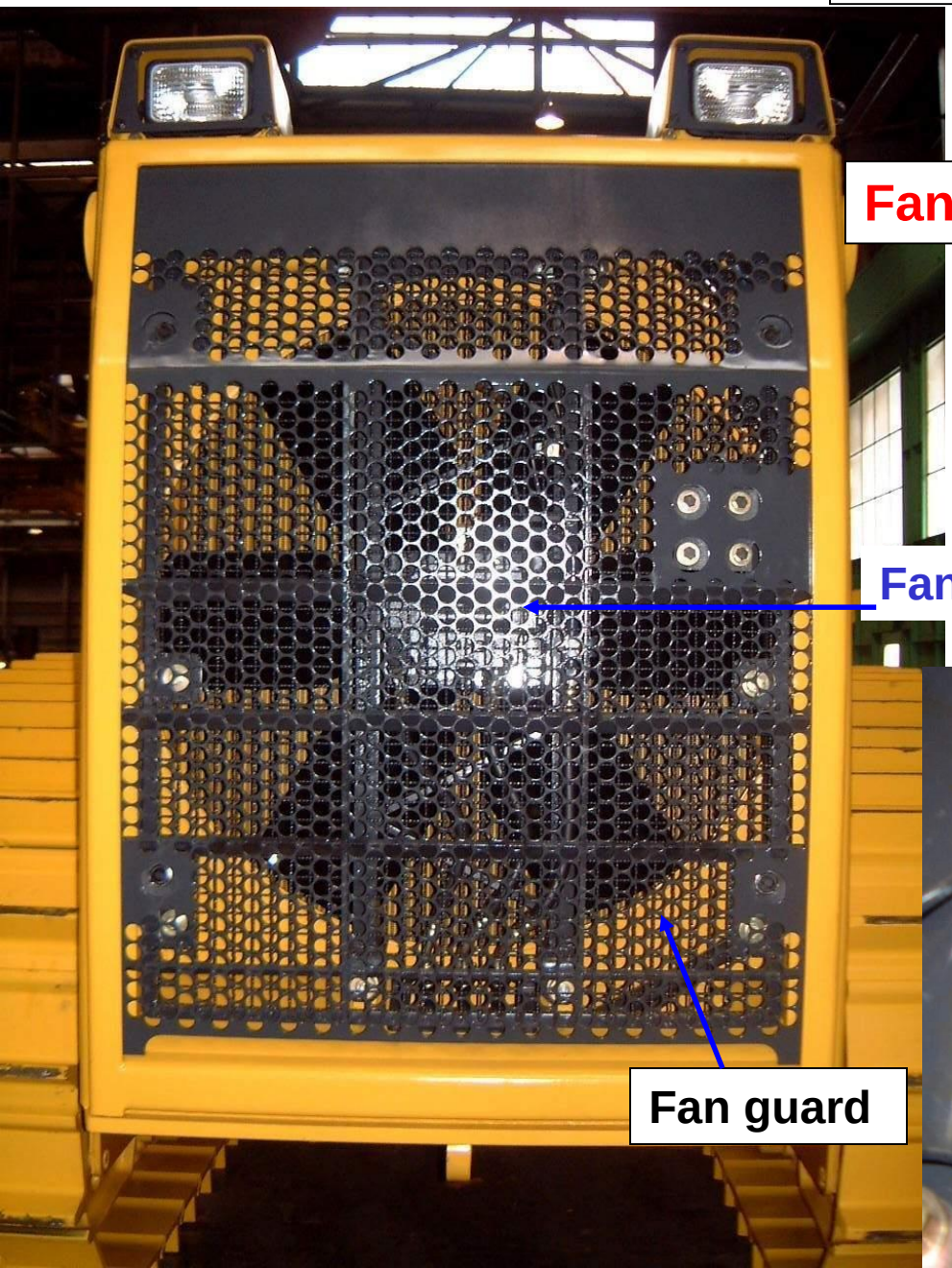
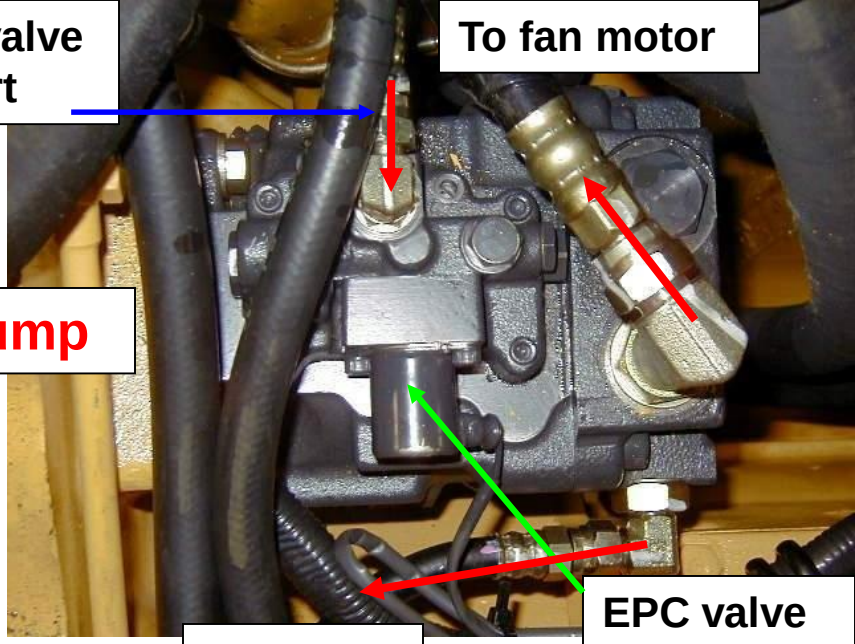
D155AX-5 Bulldozers

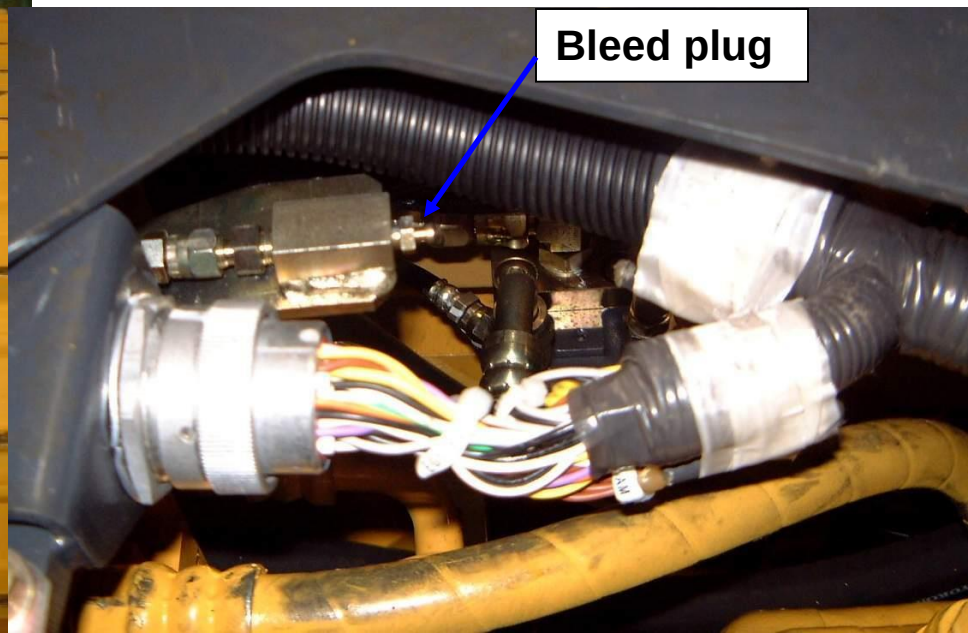
Chapter 6 : Hydraulic fan circuit

Fan circuit

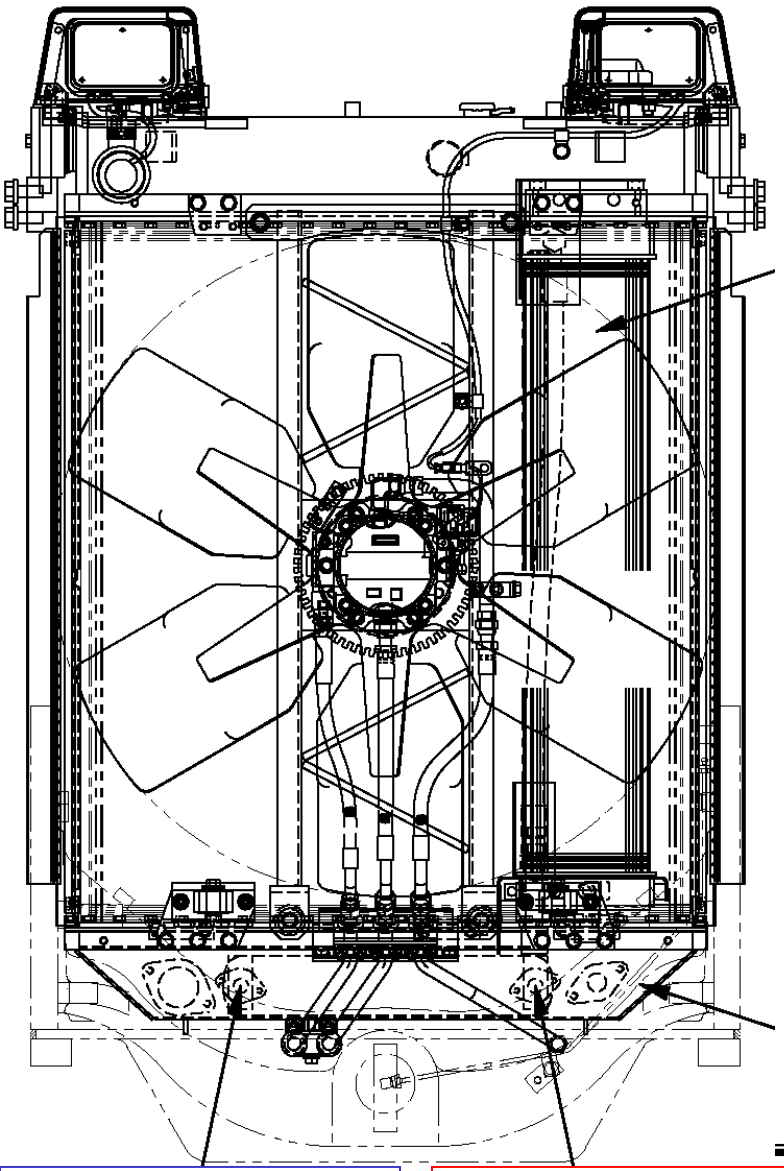




Fan motor



Fan motor



Oil cooler outlet

Oil cooler inlet

EPC valve

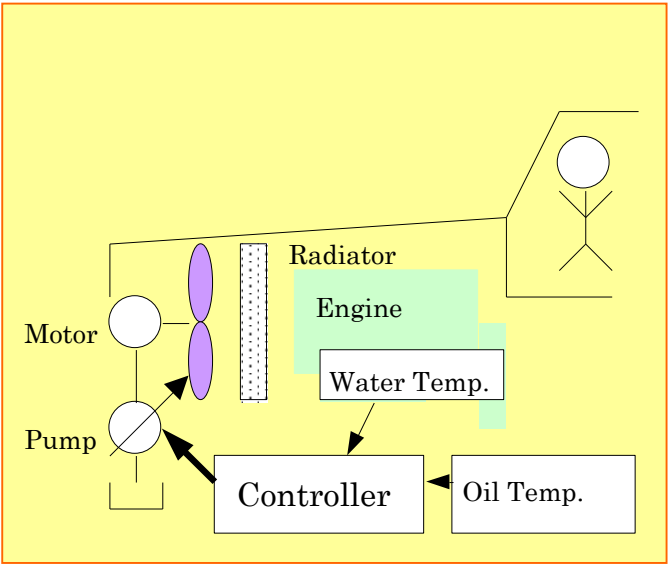
Safety valve

To tank

To cooler and tank

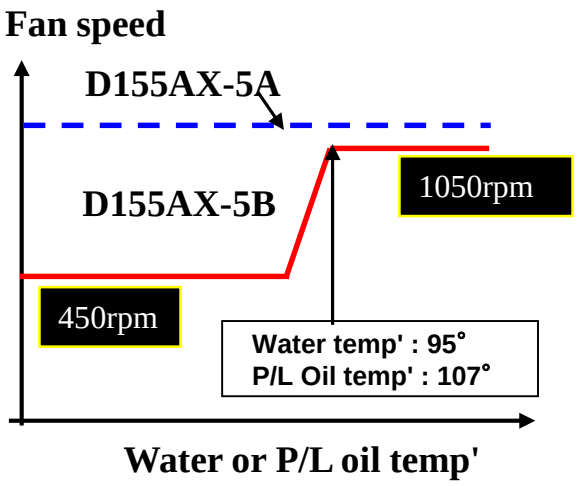
From fan pump

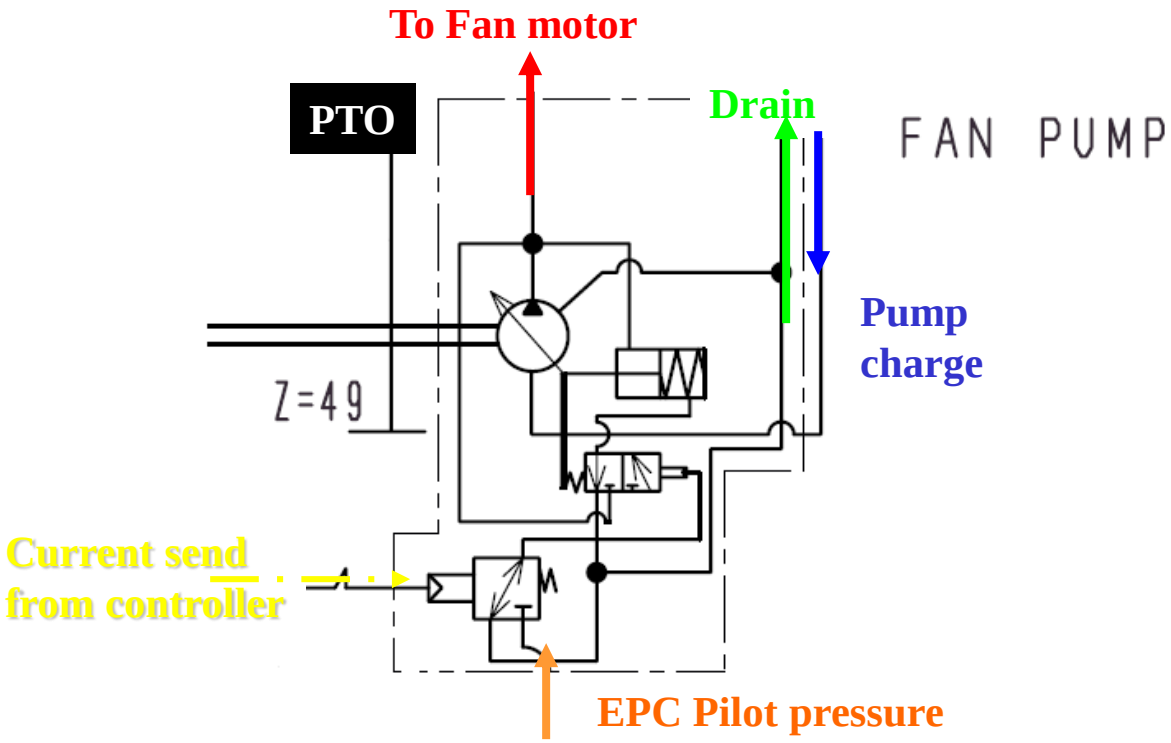
Fan pump



Function

- The rotation and torque of the engine are transmitted to the shaft of this pump and converted into hydraulic energy in this pump. This pump discharges the pressurized oil according to the load.
- The discharge of this pump can be changed by changing the swash plate angle in it.



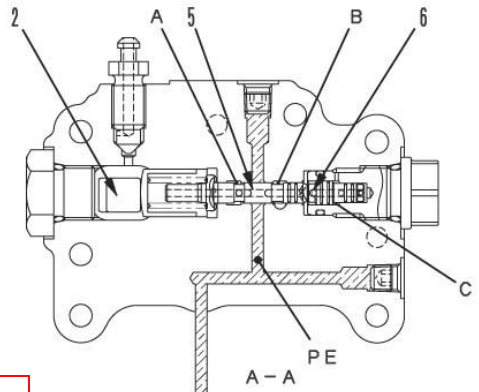


COOLING FAN PUMP [No.1]

A: Drain side
B: Pump discharge pressure input side
C: EPC output pressure received
D: EPC output pressure

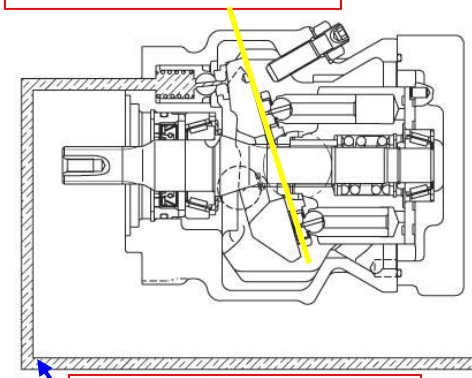
Function

- The servo valve controls the current input to the EPC valve and the swash plate angle of the pump so that they will be related as shown in the figure.
- The relationship between the input current to the EPC valve and the output pressure of the EPC valve is as follows.

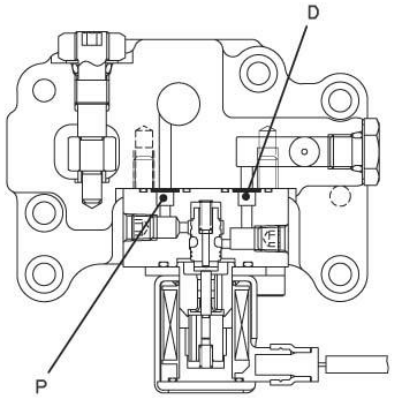


Fan pump

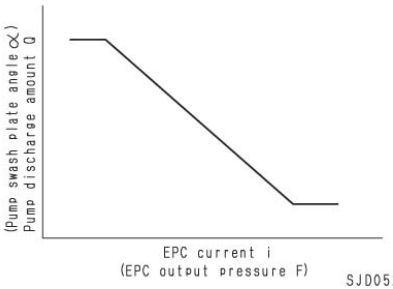
Swash plate angle



Servo pressure



Big



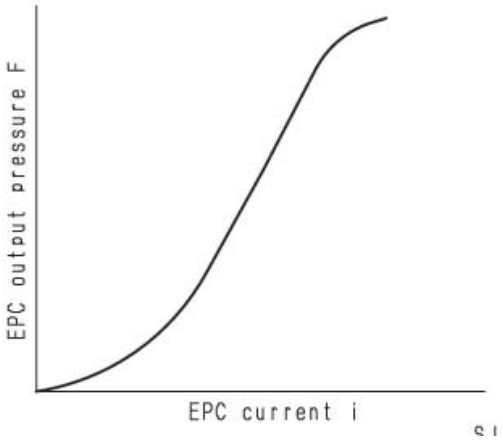
Cooling fan rotation

High

Oil or Water Tem'p	EPC Current(A)	Servo Pressure	Swash plate Angle	Pump flow (Q)	Fan speed (rpm)
Low	High	High	Small	Small	Slow
High	Low	Low	Big	Big	Fast
(Out of order)	----	Low	Big	Big	Fast

COOLING FAN PUMP [No.2]

Operation



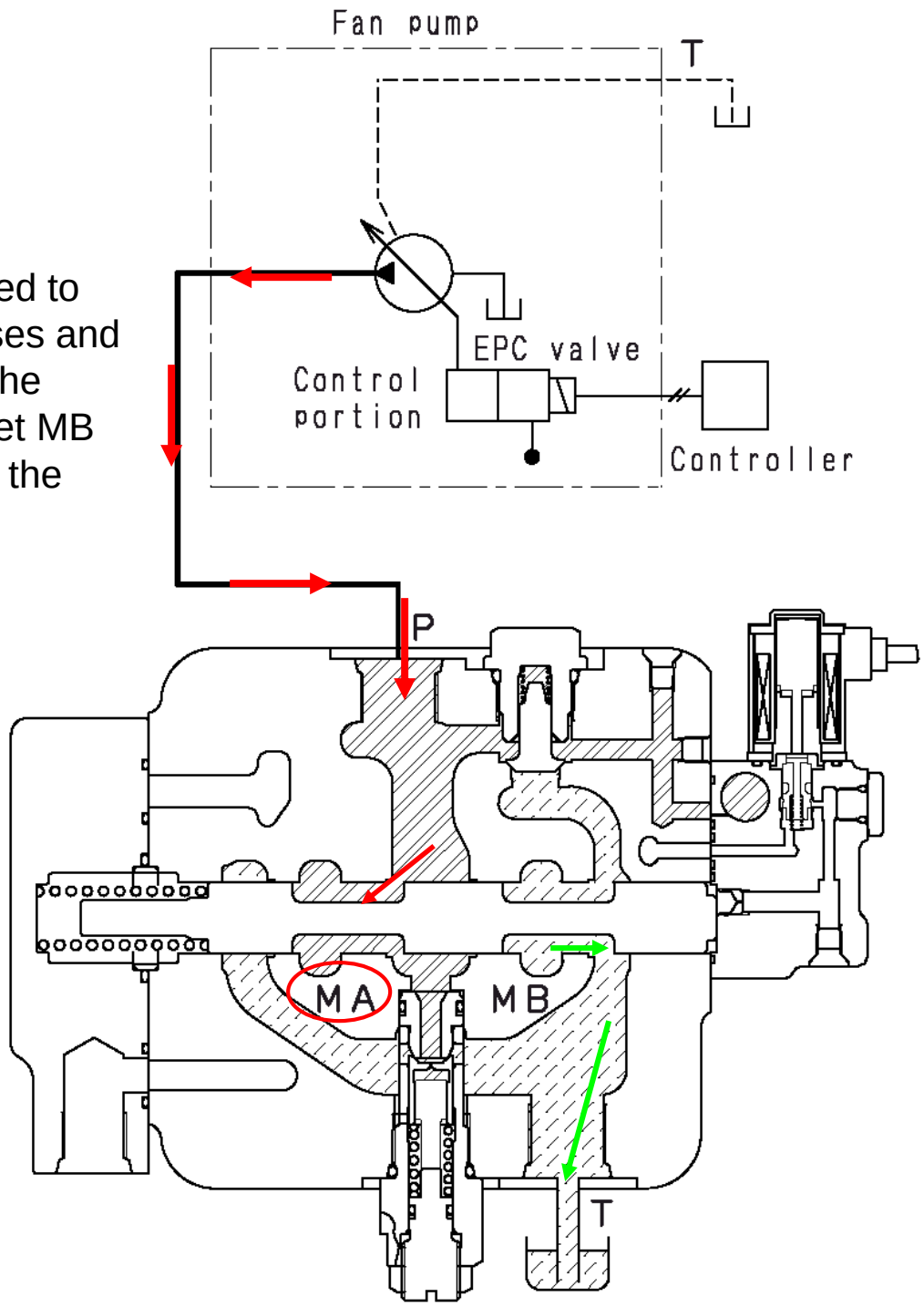
- The output pressure of the EPC valve is applied to the piston chamber to push the piston. Piston (6) pushes spool (5) until it is balanced with the spring.
- Then, the land of the servo piston pressure passage is connected to the pump discharge passages by the cut of spool (5) and the discharge pressure is led to the servo piston.
- The servo piston is raised by the rocker cam.
  The position feedback is applied and the lever moves to compress the spring.
- If spool (5) is pushed back, the pump discharge circuit and the servo piston circuit are shut off.
  The pressure in the servo piston chamber lowers and the rocker cam returns toward the maximum swash plate angle.
- These processes are repeated until the swash plate is fixed to a position where the EPC output is balanced with the spring force.
- Accordingly, as the EPC output pressure is heightened, the swash plate angle is decreased.
  As the EPC output pressure is lowered, the swash plate angle is increased.

COOLING FAN PUMP [No.3]

Operation

1. When pump is started

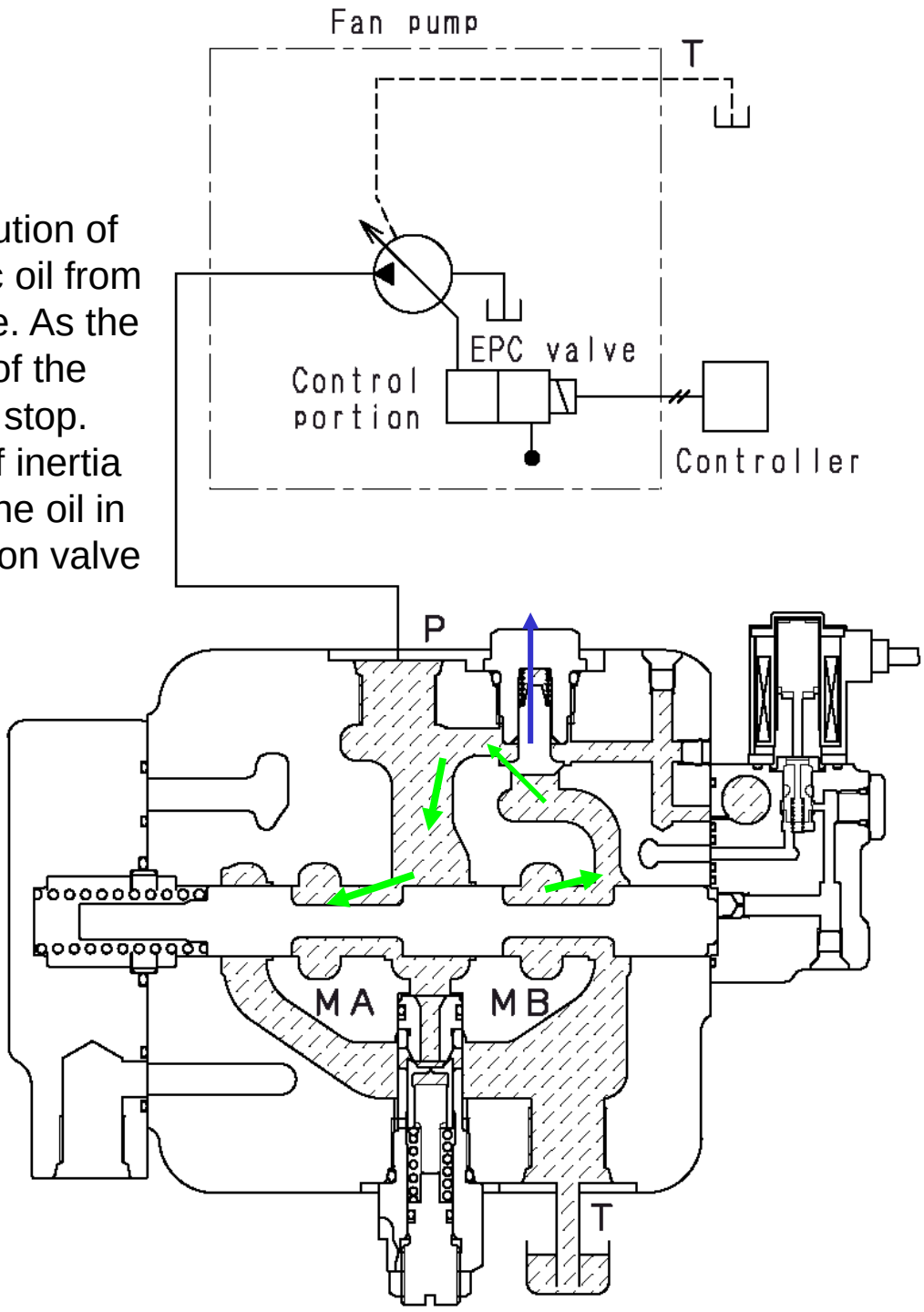
- If the hydraulic oil from the pump is supplied to port P and the pressure on the MA side rises and starting torque is generated in the motor, the motor starts revolution. The oil on the outlet MB side of the motor returns through port T to the tank.



COOLING FAN PUMP [No.4]

2. When pump is stopped

- If the engine is stopped and the input revolution of the fan pump lowers to 0 rpm, the hydraulic oil from the pump is not supplied to port P any more. As the hydraulic oil is not supplied to the MA side of the motor, the motor speed lowers gradually to stop.
- If the motor shaft is revolved by the force of inertia while the oil flow in the port P is reducing, the oil in port T on the outlet side is sent by the suction valve (1) to the MA side to prevent cavitations.

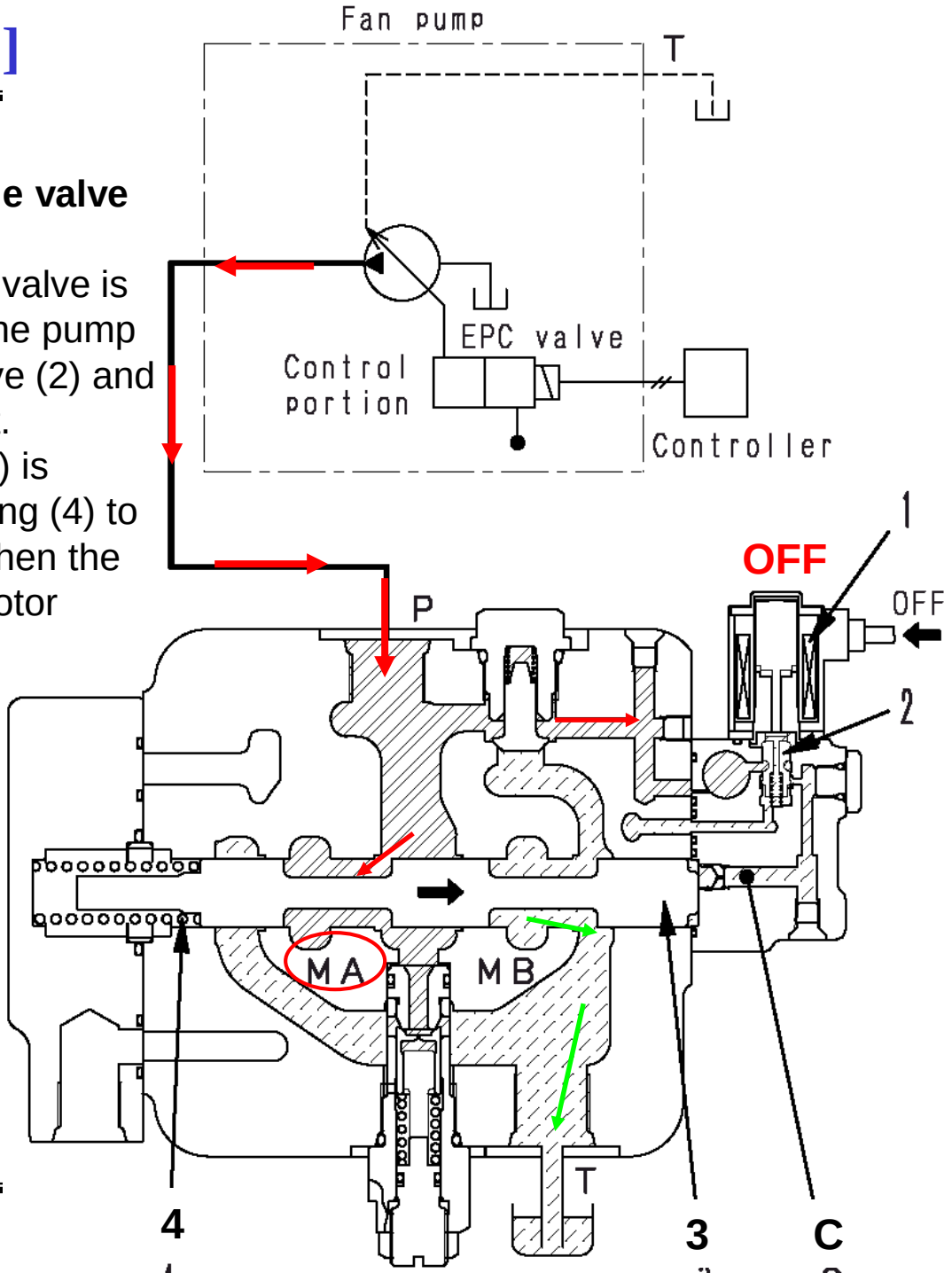


COOLING FAN PUMP [No.5]

OPERATION OF REVERSIBLE VALVE

(1) When ON-OFF solenoid for reversible valve is turned OFF

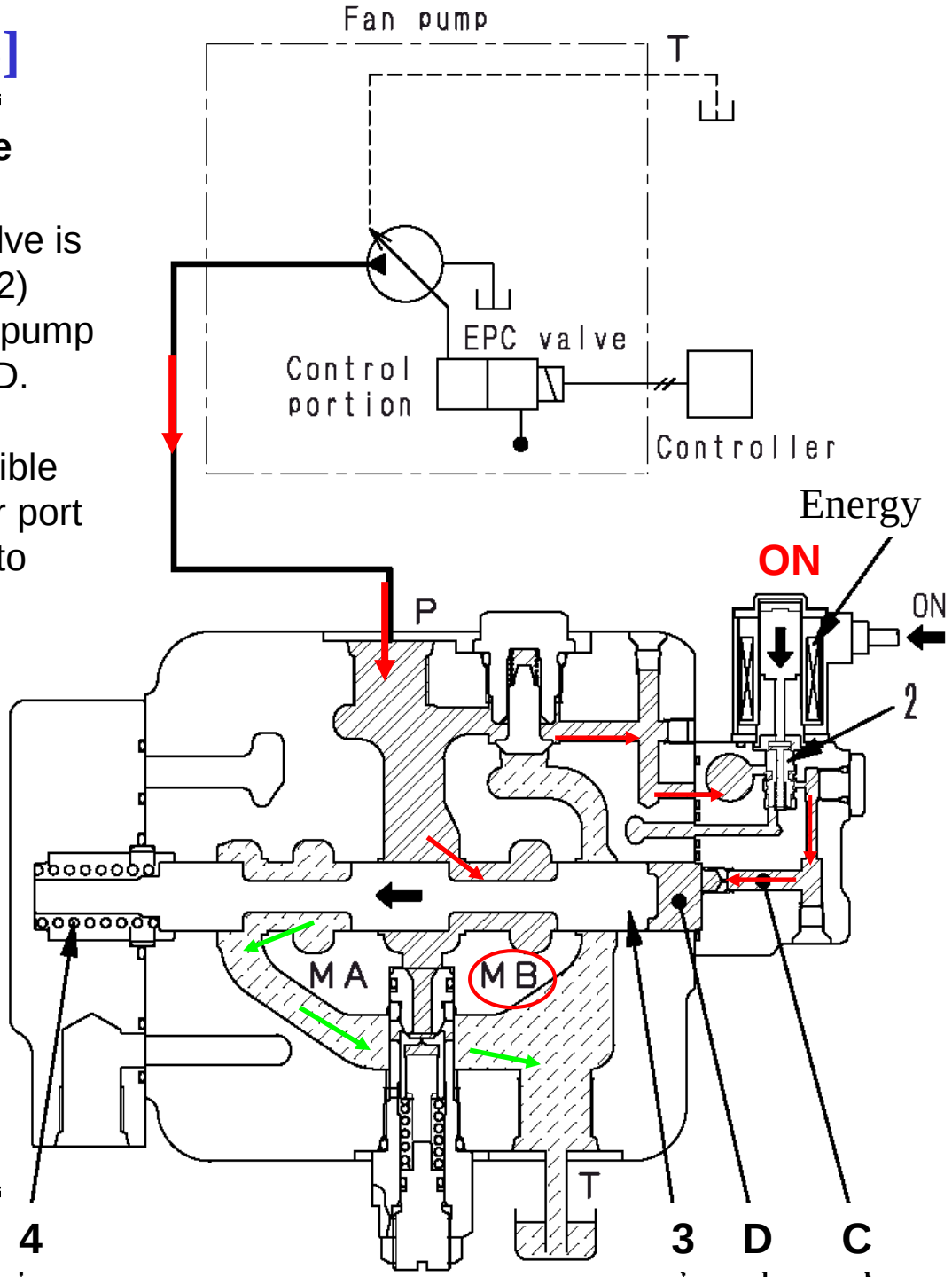
- If ON-OFF solenoid (1) for reversible valve is turned "OFF", the hydraulic oil from the pump is blocked by ON-OFF reversible valve (2) and port C is connected to the tank circuit.
- Accordingly, reversible valve spool (3) is pushed by reversible valve spool spring (4) to the right to open motor port MA and then the hydraulic oil flows in to revolve the motor forward (clockwise).



COOLING FAN PUMP [No.6]

(2) When ON-OFF solenoid for reversible valve is turned ON

- If ON-OFF solenoid (1) for reversible valve is turned "ON", ON-OFF reversible valve (2) changes to let the hydraulic oil from the pump flow through port C into spool chamber D.
- The hydraulic oil in chamber D pushes reversible valve spool (3) against reversible valve spool spring (4). As a result, motor port MB opens and the hydraulic oil flows in to revolve the motor in reverse (counterclockwise).



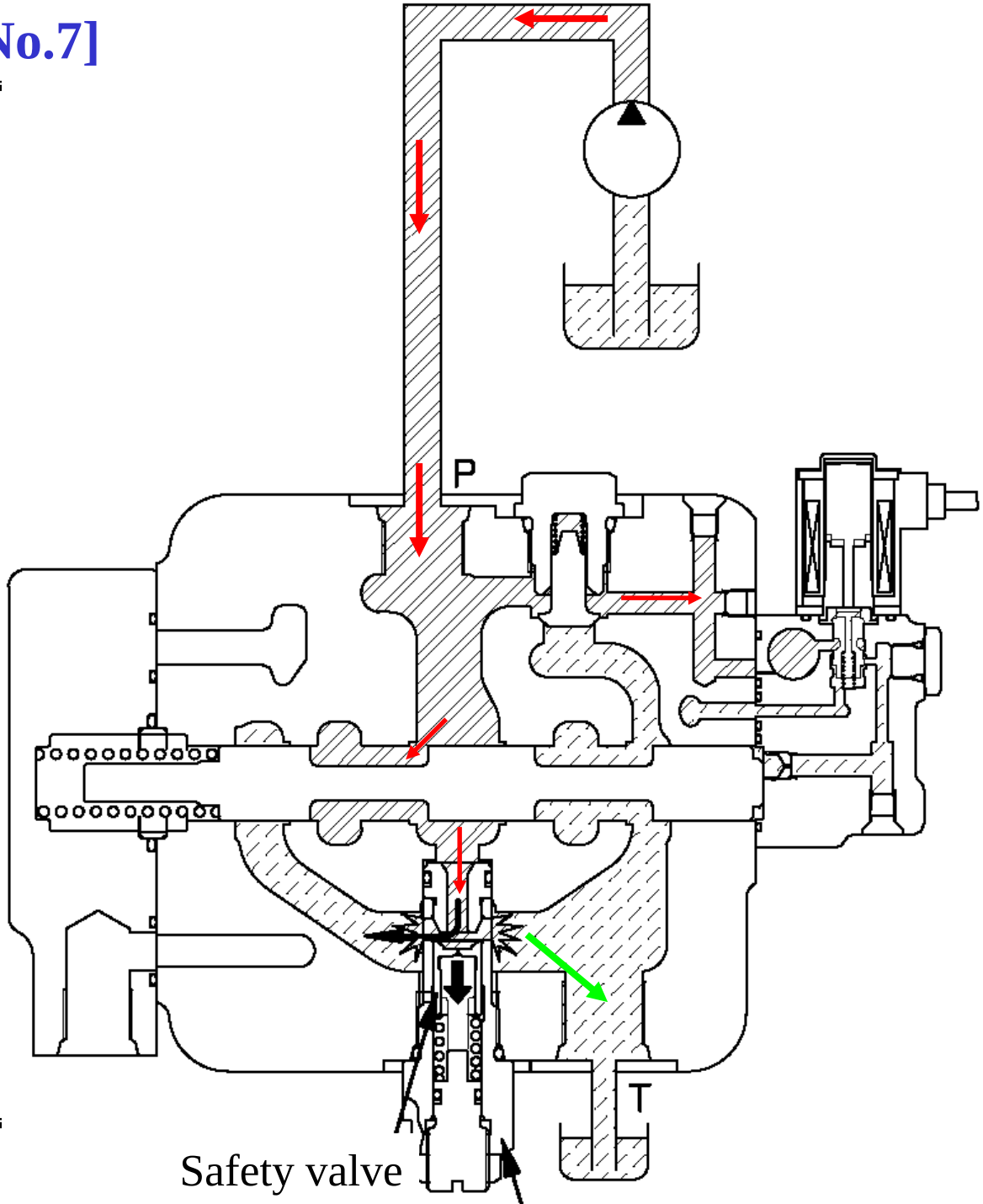
COOLING FAN PUMP [No.7]

Safety valve Function

- When the engine is started, the pressure in port P of the fan motor is heightened in some cases.
- Safety valve (1) is installed to protect the fan system circuit.

Operation

- If the pressure in port P rises above the cracking pressure of safety valve (1), valve (2) of safety valve (1) opens to release the hydraulic oil into port T.
  By this operation, generation of abnormal pressure in port P is prevented.



FAN pump